

# EK-G/EW-G Series

## *Compact Balances*

EK-120G/EK-200G/EK-600G

EK-1200G/EK-2000G/EK-6000G/EK-12KG

EW-60G/EW-300G/EW-600G/EW-3000G

OP-03/OP-04/OP-05/OP-07/OP-09/OP-11

# INSTRUCTION MANUAL

INSTRUCTION : EK-G/EW-G Series

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### ***COMPLIANCE WITH FCC RULES***

Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. If this unit is operated in a residential area it might cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.

(FCC = Federal Communications Commission in the USA.)

### ***Note for NTEP/USA models***

***EK-120G, EK-600G, EK-1200G, EK-6000G, EK-12KG***

Please note that the operating temperature of NTEP/USA class II models is 5°C to 40°C.

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# Chapter 1: Outline

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## 1-1 Outline

The EK-G series are high resolution type electronic balances having a resolution of 1/6,000 ~ 1/20,000, while the EW-G series have a resolution of 1/3,000. However, apart from the difference in resolution, the EK-G series and EW-G series are both provided with the same functions.

By using the optional rechargeable battery pack, the balance can be used for cordless operation.

## 1-2 Before using the balances

Before using these balances, keep the following points in mind:

1. Install the balances on a flat platform that is not subject to vibration or drafts.
2. Avoid using the balances in locations that are exposed to direct sunlight.
3. Be careful of external power source noise, powerful electric waves and magnetism, etc.
4. Rotate the adjustable foot to adjust the balances until the bubble of the level-vial moves to the center of the circle.
5. Avoid using the balances in very dusty locations or in places where the balances may be splashed with liquids.
6. Charge the battery pack (AD-EKW-09G:Optional) before using it for the first time.

## Chapter 2: Preparations

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### 2-1 Composition

When opening the packing case, check whether all of the following items are included:

Main unit

Weighing pan

AC adaptor

Instruction manual

### 2-2 Power source

For the power source, it is possible to use the AC adaptor or the rechargeable battery pack (AD-EKW-09G: Optional item, sold separately).

#### When using the AC adaptor

Use a stable power source. The use of an unstable power source that includes momentary power failures or noise components may give cause mis-operation.

To use the AC adaptor, insert the AC adaptor plug into the main unit AC adaptor jack.

#### When using the rechargeable battery pack

Insert the rechargeable battery pack into the main unit.

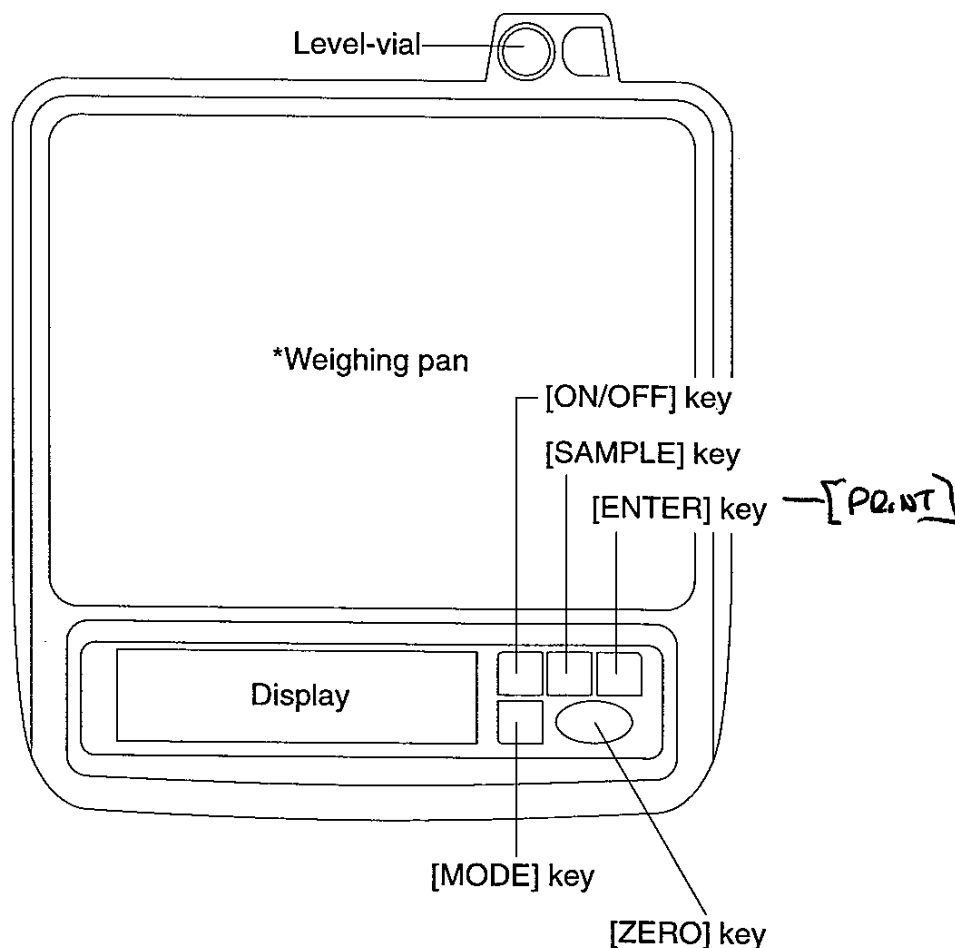
The balance can be used continuously for 9 hours using the battery pack. (However, with options installed, the time will be approximately 7 hours. The time may vary according to the method of use.)

● *If "Lb" is displayed when using the battery pack, immediately stop using the battery and recharge it or change to using the AC adapter.*

■ *See "7-5 OP-09 Rechargeable battery pack", for instructions for installation and charging of the battery pack.*

## Chapter 3: Names and functions of each part

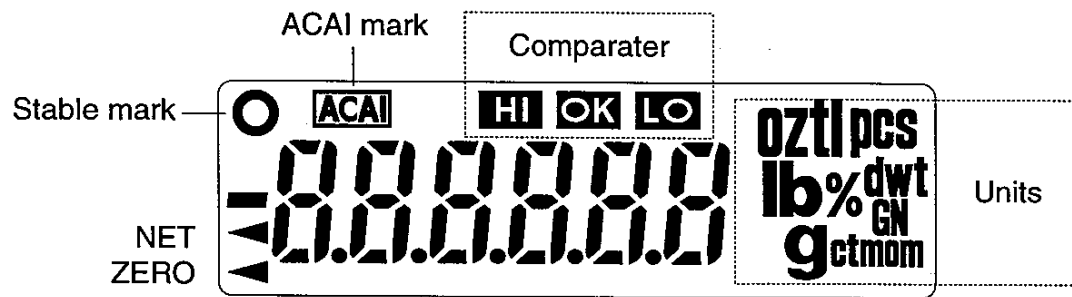
### 3-1 Front panel



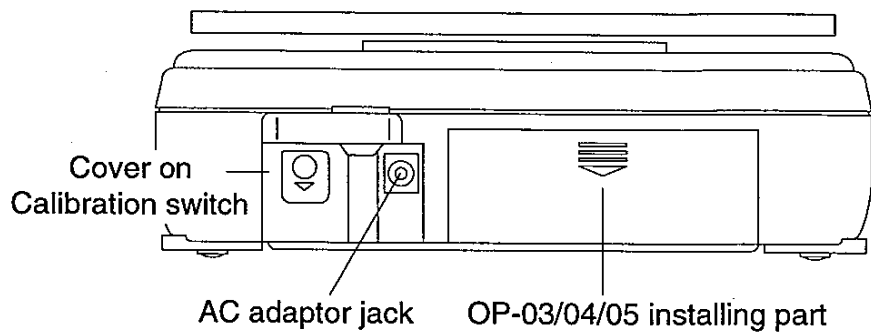
\*Weighing pan; EK-120G, EK-200G and EW-60G are round type.

[ON/OFF] key	This is the power ON/OFF switch.
[SAMPLE] key	Used to register the unit weight in the counting mode and to register the 100% weight in percentage mode. This key is also used to specify the numerical values.
[ENTER] key	When the [SAMPLE] key is being used to register a new condition, pressing this key will carry out the registering. In the weighing value display mode, this key becomes the [PRINT] key.
[MODE] key	Changes the display units. Also used to select one of the figures of a numerical value.
[ZERO] key	Sets the display to zero. This key is effective when the weighing value is stable.

## Display (Liquid crystal display unit)

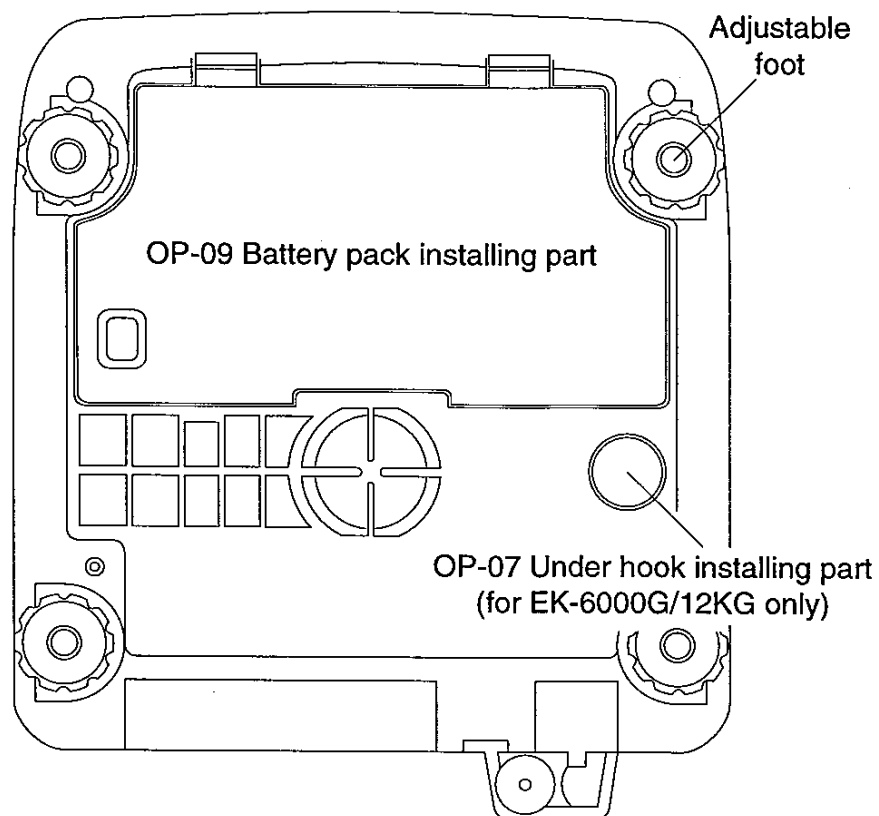


### 3-2 Rear panel





### 3-3 Bottom



## Chapter 4: Method of use

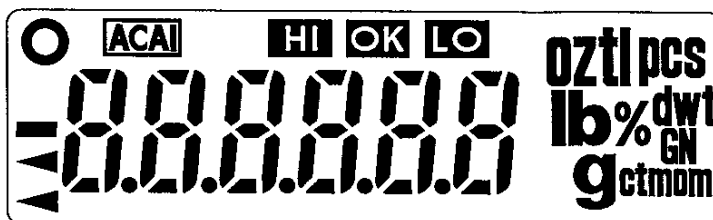
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### 4-1 Switching the power ON and OFF

Use the AC adaptor or Rechargeable battery pack as the power source.

Start with the weighing pan empty (no load).

1. By pressing the [ON/OFF] key, the balance enters the power ON condition.



All the display symbols light as shown in the illustration above.

The weighing units displayed will be the registered mode units.

When the internal operations of the balance is normal and the weight value has become stable, the display will clear and zero will be displayed.

The range for setting the zero is within  $\pm 10\%$  of the weighing capacity when compared to the zero during calibration.

If the power is switched ON while there is a load on the weighing pan and this range is exceeded, “— — — — —” will be displayed.

Remove the load, allow the balance to zero and proceed with use.

If the “— — — — —” display does not disappear,  
see Chapter 8: Maintenance.

2. By pressing the [ON/OFF] key in the power ON condition, the power will be switched OFF.

#### ■ Auto power off function

*After switching the power ON, it is possible to have the power automatically switch OFF if zero is displayed for approximately 5 minutes.*

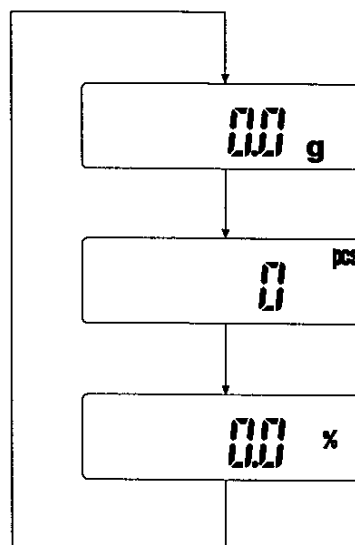
*See Chapter 6: Function modes.*

## 4-2 Mode changing

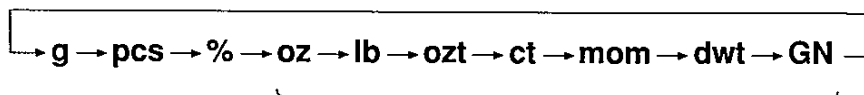
The display units in this instrument are g, pcs, %, oz, lb, ozt, ct, mom, dwt and GN. (The units in the metric specification are g, pcs and % only.) The display units can be changed by pressing the [MODE] key in the power ON condition.

1. Press the [ON/OFF] key to set the balance to the ON condition.
2. The "g" units will be displayed if selected, see mode registration as shown in the illustration at right.
3. Pressing the [MODE] key will change the units to "pcs".
4. Pressing the [MODE] key once again will change the units to "%", etc.

Example using the EK-1200G. The position of the decimal point will differ depending on the type and model of the instrument.



If registered the units will change as follows:



These units are set by the factory.

### ■ Mode registration

*It is possible to register only the units that will be actually used from the units available, and it is also possible to specify the display units that will be shown first when the power is switched ON.*

*See "4-6 Mode registration".*

## 4-3 Weighing display (g) mode

1. Confirm that the units displayed are "g". If another unit is displayed, press the [MODE] key to change to the "g" units.

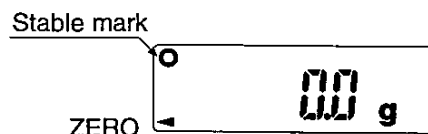
Example using the EK-1200G. The position of the decimal point will differ depending on the type and model of the instrument.

2. Confirm that the display shows zero and that the Stable mark is on.

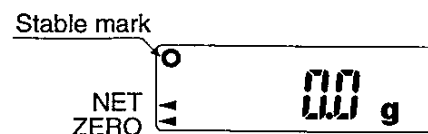
**The Stable mark will be on when the display is stable.**

When the display shows a value other than zero, press the [ZERO] key to set the display to zero.

**The [ZERO] key is effective only when the Stable mark is on.**



3. When using a tare (container), place the container on the weighing pan. When the Stable mark comes on, press the [ZERO] key to set the display to zero.



4. Place the item for weighing on the weighing pan and read the displayed value after the Stable mark has come on.



- **The [ZERO] key will set zero if the weight is within  $\pm 2\%$  of the weighing capacity as compared to the zero point at power ON. Further, tare weighing operation will be carried out for weights that exceed  $+2\%$  of the weighing capacity.**

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## 4-4 Counting (pcs) mode

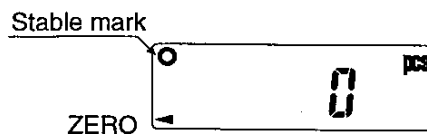
For a standard sample unit weight (the weight of one item), the equivalent of the number of standard units contained in the sample that is being weighed will be calculated and displayed.

### Using the counting mode

1. Press the [MODE] key to change the units display to "pcs".
2. Registration of the unit weight.

**If there is a unit weight already registered, and if this weight is to be used without changing the weight value, re-registering will not be necessary.**

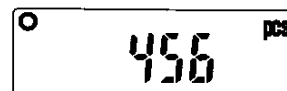
3. Confirm that the display shows "0" and that the Stable mark is on.



When using a tare (container), confirm that the display shows "0" and that the Stable mark is on when the container is placed on the weighing pan.

**If the display is not "0", press the [ZERO] key to set the display to zero.**

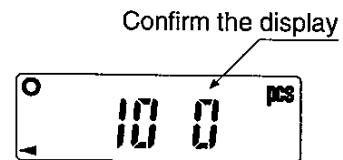
4. Place the item to be weighed on the weighing pan and read the displayed value after the Stable mark has come on.



## Registering the unit weight

1. In the counting mode condition, press the [SAMPLE] key.

The display will change to the unit weight registering display.



Confirm that "0" is displayed on the right hand side of the "10".

**If "-" is displayed on the right hand side of the "10", the zero has become displaced. Press the [ZERO] key to set the display to zero.**

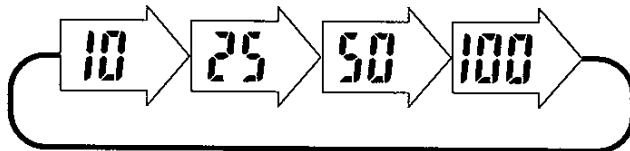
**Further, the "-" display will also be shown when there is a weight on the weighing pan.**

When using a tare (container), place the container on the weighing pan then press the [ZERO] key to set the displayed value on the right hand side of the "10" to "0".

2. The "10" shows the number of samples that are registered for use.

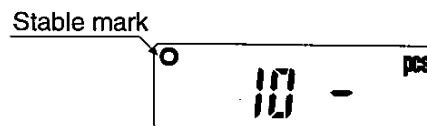
To change the sample number, press the [SAMPLE] key to change the displayed numbers.

The number of samples will change as shown below:

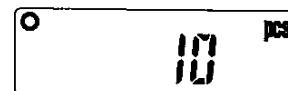


Example of 10 sample units:

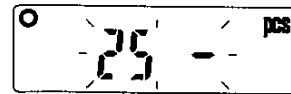
3. Place the displayed number of samples on the weighing pan. When the Stable mark is displayed, press the [ENTER] key.



4. The unit weight will be registered and the display will change to show the count.



- 
5. If the count is not displayed, and if the type of display shown in the illustration at right is flashing, the number of samples that have been placed on the weighing pan is too light to obtain an accurate unit weight. This display is requesting that a larger number of samples should be used to determine the unit weight.



One of the 25, 50 or 100 numbers are flashing

**After increasing the number of samples to make up the requested sample number (Total value), press the [ENTER] key.**

**The accurate unit weight will be registered.**

If the [ENTER] key is pressed without increasing the number of samples as requested, although the unit weight will be registered, the counting accuracy will be degraded.

6. When the unit weight is too light, "Lo" will be displayed when the unit weight is less than the weight possible for counting.

- ***To discontinue with registering, press the [MODE] key. The display will return to the previous counting display.***
- ***The registered unit weight will be stored in memory even when the power is switched OFF.***

---

## **ACAI (Automatic Counting Accuracy Improvement) function**

In order to calculate the unit weight, the larger the number of samples, the smaller the error will be due to the averaging out of the range of differences that are present in each of the samples. However, it is troublesome to have to count a large number of samples. For this reason, the ACAI (Automatic Counting Accuracy Improvement) function is used to obtain an accurate count with the least possible number of samples.

In this function, first a 10 unit sample is counted and the unit weight is registered. Further, when more units are added, this unit weight is used as the basis for calculating the counting, and if there is no error in the result, the estimated additional number of units will be shown as the ACAI range. If the data is stable within this range, a division of the sample weight that is currently on the weighing pan by the number of units will be carried out, and the unit weight will be updated.

By this method of counting only 10 units at first and by afterwards merely adding samples as appropriate until the ACAI symbol mark disappears, the number of units can be accurately counted. Further, in order to prevent mis-operation the ACAI range is set so that the units that are added must be 4 or more. In addition, when 100 units are exceeded the ACAI range will have no fixed upper limit. Add the additional units while aiming to make the displayed number of units the same as the actual number of units.

In actual operation:

When the number of added items is within the ACAI range:

The ACAI symbol mark will be lit.

When the recalculation of the unit weight has been completed:

After flashing 3 or 4 times, the ACAI symbol mark will be cleared.

- When the unit weight is small (roughly 10d or less), the ACAI range will be about half of its normal range. (d: Minimum display)
- When the range of differences between each of the samples is too large, accurate counting will become extremely difficult.



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## 4-5 Percentage (%) mode

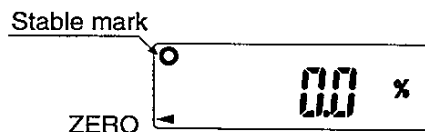
Taking the standard sample weight as 100%, the weights of other objects are compared and displayed as a corresponding percentage. Compared to the standard weight, an allowable range of a certain percentage can be prepared for use in judging and for specific gravity measurement.

### Using the percentage mode

1. Press the [MODE] key to change the displayed units to "%".
2. Registration of the 100% weight.

**If there is a 100% weight already registered, and if this weight is to be used without changing the weight value, re-registering will not be necessary.**

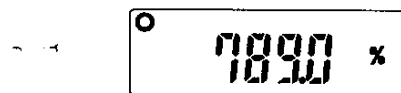
3. Confirm that the display shows zero and that the Stable mark is on.



When using a tare (container), confirm that the display shows zero and that the Stable mark is on when the container is placed on the weighing pan.

**When the display is not at zero, press the [ZERO] key to set the display to zero.**

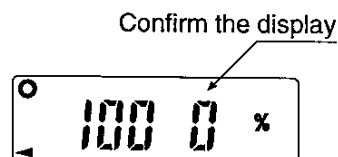
4. Place the item for weighing on the weighing pan and read the displayed value after the Stable mark has come on.



## Registering the 100% weight

1. In the percentage mode condition, press the [SAMPLE] key.

The display will change to the 100% weight registering display.



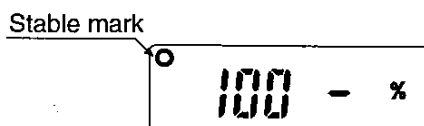
Confirm that "0" is displayed on the right hand side of the "100".

**If "-" is displayed on the right hand side of the "100", the zero has become displaced. Press the [ZERO] key to set the display to zero.**

**In addition, the "-" display will also be shown when there is a weight on the weighing pan.**

When using a tare (container), place the container on the weighing pan then press the [ZERO] key to set the displayed value on the right hand side of "100" to "0".

2. Place the sample that is to be set as the 100% weight on the weighing pan. When the Stable mark is displayed, press the [ENTER] key.



3. The 100% weight will be registered and the display will change to show the percentage display.



4. When the 100% weight is too light, "Lo" will be displayed when the 100% weight is less than the minimum weight.

- **To discontinue with registering, press the [MODE] key. The display will return to the previous display.**
- **The registered 100% weight will be stored in memory even when the power is switched OFF.**

## 4-6 Mode registration

Out of the available display units; g, pcs, %, oz, lb, ozt, ct, mom, dwt and GN, it is possible to register only the modes that will actually be used, and also to specify the units that will be shown first when the power is switched ON.

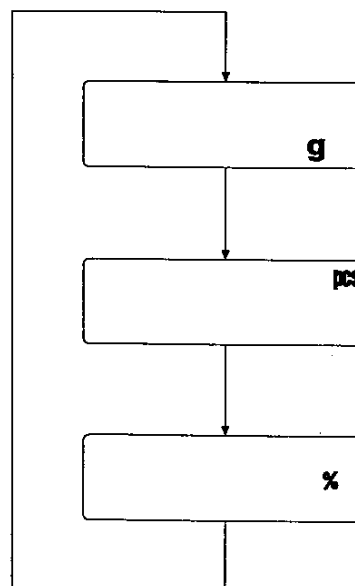
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## Method of registration

e.g. Registering g and %

1. In the power OFF condition, press and hold the [MODE] key then press the [ON/OFF] key to switch ON the power.
2. Confirm that "g" is being displayed. If the display is anything other than "g", press the [ON/OFF] key to return to the OFF condition, then repeat the operation in step 1.
3. By pressing the [MODE] key, the display will change.

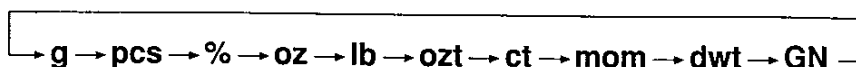
4. The "g" units which are to be registered should be displayed. By pressing the [SAMPLE] key, the units will be registered and the display will show the next unit display ("pcs").
5. In this example, the "pcs" units are not to be registered, so press the [MODE] key to change the display.
6. The "%" units which are to be registered will be displayed. By pressing the [SAMPLE] key, the units will be registered and the display will change to show the next unit display.



7. When registering has been completed, press the [ENTER] key and the display will show "End". Press the [ON/OFF] key to switch OFF the power.

- ***When the power is switched ON, the units that are displayed will start from the units that were registered first using the [SAMPLE] key.***

***The units will change in the following sequence. (The units can not change in the reverse direction.)***



These units are set by the factory.

- ***To stop the registration operation, switch the power OFF, then repeat the operation again.***

---

## 4-7 Comparator

### Comparator function

The comparator function operates in all modes. If the displayed value is greater than the upper value, "HI" will be displayed, and if the displayed value is less than the lower limit value, "LO" will be displayed. "OK" will be displayed when the displayed value is between the upper limit and lower limit values.

$$LO < \text{Lower limit value} \leq OK \leq \text{Upper limit value} < HI$$

"HI" will be displayed for a plus overload ("E" display), and "LO" will be displayed for a minus overload ("-E" display).

■ ***In order to use the comparator function, set the comparator function to ON with the function settings.***

***See Chapter 6: Function mode.***

### Comparison mode

When using the comparator function, it is possible to select which type of data is to be compared out of the following 6 types of data. Set the comparator comparison mode with the function settings.

1. Compare all data.
2. Compare all stable data.
3. Compare all plus data, excluding data close to zero.
4. Compare stable plus data, excluding data close to zero.
5. Compare all data, excluding data close to zero.
6. Compare stable data, excluding data close to zero.

● ***Data close to zero represents the range of -4d to +4d in the "g" display.***  
***(d: Minimum display)***

### Comparator relay output

By attaching the Comparator relay output option (OP-04), it is possible for each type of comparison result to be output as a relay contact point output.

When using the comparator function, it is possible to sound a buzzer according to each type of comparison result. Set the comparator buzzer output with the function settings.

---

## Setting the upper limit and lower limit values

When setting the upper and lower limit values, the decimal point will not light.

In the counting mode, since there is no decimal point the display will be as normal. However, in the weighing display mode and percentage mode the values should be set while assuming that the decimal point is in the proper position.

The upper limit and lower limit numerical values are common to each of the weighing, counting and percentage modes.

### [Example for the EK-1200G]

When the upper limit value is set to "1000" and the lower limit value is set to "500":

Upper limit value: "100.0g" "1000pcs" "100.0%"

Lower limit value: "50.0g" "500pcs" "50.0%"

1. In the power OFF condition, press and hold the [SAMPLE] key then press the [ON/OFF] key to switch ON the power.

2. The display first shows the upper limit setting display. Although the units will not be displayed, the value that is set as the upper limit and "HI" will be displayed.



3. To change the set value, use the [MODE] key to select the figures for changing, and use the [SAMPLE] key to specify the numerical values. By pressing the [ENTER] key, the set value will be memorized and the display will move forward to the lower limit setting mode. Further, if the set value is not to be changed, press the [ENTER] key to move forward to the lower limit setting mode.

Although the units will not be displayed, the value that is registered as the lower limit and "LO" will be displayed.



4. Set the lower limit value using the same method as for the upper limit value setting. However, the lower limit value should be set so that the upper limit value  $\geq$  the lower limit value.
5. After completing the setting of the lower limit value, "End" will be displayed. Press the [ON/OFF] key to switch OFF the power.

- **The upper limit and lower limit values will be stored in memory even after the power has been switched off.**
- **Minus values may be set as the upper limit and lower limit values. Use the [ZERO] key to switch between plus and minus.**

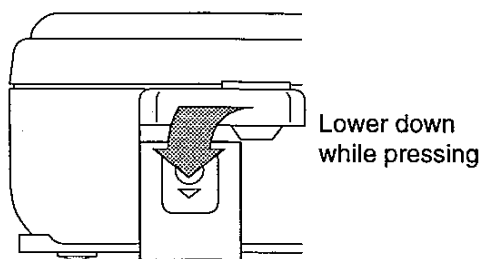
## Chapter 5: Method of calibration

### 5-1 Correction for acceleration due to gravity

The EK/EW-G series balances are adjusted so that their gravity accelerations are set to  $9.798\text{m/sec}^2$ . To allow correct weighing, set the acceleration due to gravity to match the area that the balance is being used in by referring to the Gravity acceleration map appended to the end of this manual. Particularly in the EK-G series balances, it is recommended to carry out the zero and span calibrations at the installation location using weights.

1. Press the [ON/OFF] key to switch ON the power.

2. Remove the cover at the rear of the main unit (referring to the diagram at right) and press the calibration (CAL) switch.



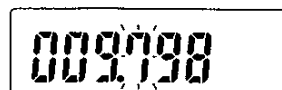
3. The balances change to the calibration mode, and the memorized value for the acceleration due to gravity is displayed.

Confirm whether the gravity acceleration value matches the acceleration due to gravity in the area where the balance is to be used by referring to the Gravity acceleration map appended to the end of this manual.

- When the value is appropriate, press the [ON/OFF] key to switch OFF the power.
- When the value is not correct, set the value of the acceleration due to gravity to the value of the area where the balance is to be used.

#### e.g. Changing the value from 9.798 to 9.806

4. The first figure after the decimal point will be flashing. The flashing cursor shows that the numerical value of this figure may be changed.



009.798

5. Set the numerical value to "8" by pressing the [SAMPLE] key.

- 
6. Press the [MODE] key to select the second figure after the decimal point. This second figure will flash.



7. Set the numerical value to "0" by pressing the [SAMPLE] key.

8. Press the [MODE] key to select the third figure after the decimal point. This third figure will flash.



9. Set the numerical value to "6" by pressing the [SAMPLE] key.



**To stop the setting and return to use the original values (in this example, 9.798), press the CAL switch. The changed value will not be memorized and the display will change to the zero and span calibrations.**

10. To register this value, press the [ENTER] key. The set value will be stored in memory and the display will change to the zero and span calibrations.



**To finish without carrying out the zero and span calibrations, press the [ON/OFF] key to switch OFF the power.**

---

## 5-2 Zero and span calibration

If the “— — — — —” display is shown when the power is switched on with no load on the weighing pan, the zero point has become displaced and calibration of the zero point will be required.

- **Carry out the zero and span calibrations where the balance is to be used.**

- **Carry out the span calibration using the correct weights.**

**Good quality weights accurate to decimal point beyond the smallest division for the balance used.**

1. Press the [ON/OFF] key to switch ON the power, and allow an adequate warm-up time (30 minutes or longer).

During the warm-up time, either release the automatic power off function or else place an object on the weighing pan so that the display is not zero.

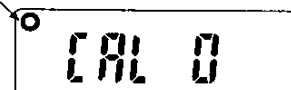
2. Referring to “5-1 Correction for acceleration due to gravity”, set the value of the gravity acceleration.

When the value is appropriate, press the [ENTER] key.

The display changes to the zero point calibration mode.

3. With no load on the weighing pan, confirm that the Stable mark is on and press the [ENTER] key.

Stable mark



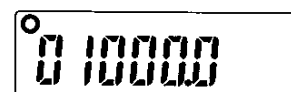
The zero point value will be stored in memory and the display will change to the span calibration mode.

**If only the zero point calibration is to be carried out, press the CAL switch after the above operation to finish. The display will show “End”, press the CAL switch once again to exit from the calibration.**

4. Place the weight specified by the displayed numerical values on the weighing pan. After the Stable mark is displayed, press the [ENTER] key. The span value will be memorized and the display will show “End”.

Example using the EK-1200G.

The numerical values will differ depending on the type and model of the instrument.



5. Remove the weight and press the CAL switch to exit from the calibration.



---

## Calibration weights

Prepare the following weights for the span calibration:

		Accuracy			Accuracy
EK-120G	100g	$\pm 0.002\text{g}$	EK-1200G	1kg	$\pm 0.02\text{g}$
EK-200G	200g	$\pm 0.002\text{g}$	EK-2000G	2kg	$\pm 0.02\text{g}$
EK-600G	600g	$\pm 0.02\text{g}$	EK-6000G	6kg	$\pm 0.2\text{g}$
			EK-12KG	10kg	$\pm 0.2\text{g}$
EW-60G	60g	$\pm 0.004\text{g}$	EW-600G	600g	$\pm 0.04\text{g}$
EW-300G	300g	$\pm 0.02\text{g}$	EW-3000G	3kg	$\pm 0.2\text{g}$

- *To change the calibration weight before placing the weight on the weighing pan, use the mode key to select the figures for changing and use the [SAMPLE] key to set the values. (The smallest figures can not be set.)*

## 5-3 Error displays during calibration

If the following types of messages are displayed during the calibration operation, this shows that an error has occurred. Check whether there is a mistake in the operation or whether the weights used are correct, etc. Switch OFF the power and then perform the calibration once again.

- CAL E

The weight is too light. This error may be caused by carrying out the span calibration with no weight on the weighing pan, if the load cell cable is not connected, or if the cable is broken.

CAL E

The weight is too heavy. This error may be caused if the load cell cable is not connected or if the cable is broken.

Err 8

The setting value or zero/span values have not been correctly memorized.

## Chapter 6: Function mode

---

The function mode allows the setting of the following functions that are included in these instruments. The setting value of each function is managed and stored for each function number.

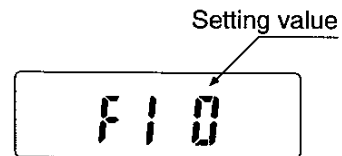
These function are:

- F1. Auto power off function
- F2. RS-232C output mode
- F3. Comparator function on/off
- F4. Comparator comparison mode
- F5. Comparator buzzer output

### 6-1 Setting the functions

1. With the power OFF, press and hold the [ZERO] key then the [ON/OFF] key to switch ON the power.

The first function "F1" will be displayed together with the setting value.



2. To change the setting value, press the [SAMPLE] key to specify the numerical value. By pressing the [ENTER] key, the setting value will be stored and the display will change to the next function number.

If the set value is not to be changed, press the [ENTER] key to change the function number.

3. Repeat this operation until "End" is displayed after setting the last function. Press the [ON/OFF] key to switch OFF the power.

---

## 6-2 Function numbers and contents

\* Shows the setting at the time of shipping.

### Auto power off function

- Sets whether the auto power off function is used or not used.

Function number	Setting value	Contents
<b>F1</b>	*0	The auto power off function is not used
	1	The auto power off function is used

**This function prevents battery exhaustion, etc. by automatically switching OFF the power when zero is displayed continuously for approximately 5 minutes during use.**

### RS-232C output mode

- Sets the RS-232C output mode.
- Sets the printing command timing of auto printing.

Auto print A: Prints only plus data

(Reset by data close to zero and minus data)

Auto print B: Prints plus and minus data

(Only reset by data close to zero)

Function number	Setting value	Contents
<b>F2</b>	0	Stream mode
	*1	Command mode and manual printing
	2	Command mode and auto print A
	3	Command mode and auto print B

\* Shows the setting at the time of shipping.

### Comparator function on/off

- Sets whether the comparator function is used or not used.

Function number	Setting value	Contents
<b>F3</b>	*0	The comparator function is not used
	1	The comparator function is used

## Comparison mode

- Sets the data for comparison

Function number	Setting value	Contents
<b>F4</b>	*0	All data
	1	All stable data
	2	All plus data, excluding data close to zero
	3	Stable plus data, excluding data close to zero
	4	All data, excluding data close to zero
	5	Stable data, excluding data close to zero

## Comparator buzzer output

- Sets the type of comparison result that will cause the buzzer to sound

Function number	Setting value	Contents
<b>F5</b>	*0	The buzzer output is not used (Buzzer does not sound)
	1	LO
	2	OK
	3	LO and OK
	4	HI
	5	LO and HI
	6	OK and HI
	7	LO, OK and HI

## Factory use function

- F6 is a function for factory use. Do not change the preset value. Finish function setting by pressing [ENTER].

Function number	Setting value	Contents
<b>F6</b>		Factory use only

## Chapter 7: Options

The following options are available for the EK/EW-G series:

1. OP-03 RS-232C serial interface
2. OP-04 Comparator relay output
3. OP-05 Printer interface (Current loop output)
4. OP-07 Under hook assembly (For EK-6000G/12KG only)
5. OP-09 Rechargeable battery pack (NiCd)
6. OP-11 Carrying case

### 7-1 OP-03 RS-232C serial interface

This interface allows the EK/EW-G series to be connected with a multi-function printer or a personal computer.

The RS-232C has 2 types of modes. Select the type according to the use.

■ **The RS-232C output mode can be selected using the function settings. See Chapter 6: Function mode.**

#### Stream mode

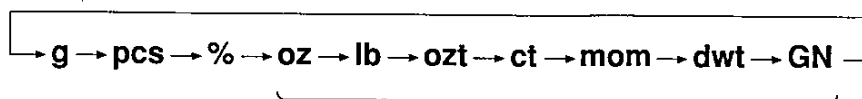
The value displayed on the balance is continuously output. Values will not be output while setting the unit weight in the counting mode, when setting the 100% weight in percentage mode or when setting the upper limit and lower limit values of the comparator. The data sending speed is 4 ~ 5 times per second.

#### Command mode

Operations such as setting zero or outputting the displayed data can be carried out by sending commands from a personal computer, etc. to the balance.

The commands that can be used are as follows:

- Z <Term>:** Carries out the same operation as the [ZERO] key when the display is stable.
- Q <Term>:** Outputs the displayed data one time, regardless of whether the display is stable or unstable. The data will not be output while setting the unit weight in the counting mode or when setting the 100% weight in percentage mode.
- U <Term>:** Changes the units. Each time the command is sent, the units will change as shown below:



These units are set by the factory.

---

<Term> represents the terminator  $C_R L_F$ .

When sending commands successively, allow an interval of 500msec or longer between commands.

## Interface specifications

Input/output standards : According to EIA RS-232C standards

Transmission format : Half duplex, bi-directional

Baud rate : Fixed at 2400bps

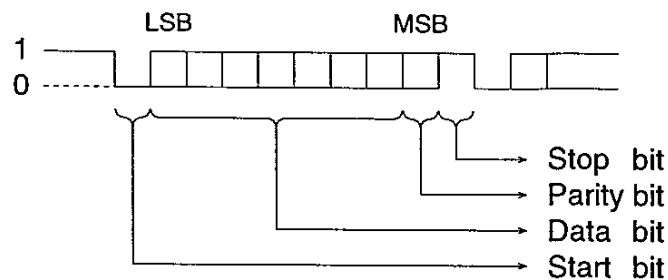
Data : 7 bits

Parity : 1 bit (Even)

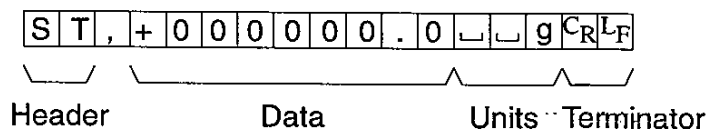
Stop bit : 1 bit

Code : ASCII

### Character format



### Data format



- There are the following four types of headers:

ST: In weighing display mode and percentage mode, the data is stable.

QT: In counting mode, the display is stable.

US: The data is unstable.

OL: The data is overloaded. (The maximum display is exceeded.)

- The data is normally 9 figures, including the sign and decimal point.

- There are the following 10 types of units: (  signifies a space.)

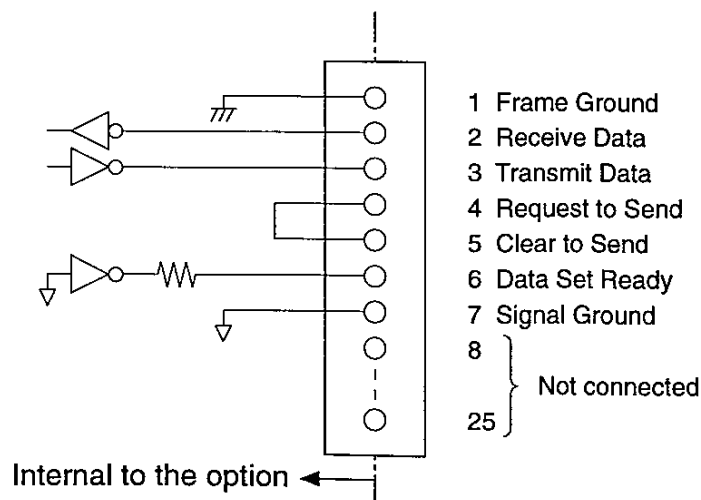
g : Weighing display mode (gram)  
oz : Weighing display mode (decimal ounce)  
lb : Weighing display mode (decimal pound)  
 oz t : Weighing display mode (troy ounce)  
ct : Weighing display mode (carat)  
 mom : Weighing display mode (momme)  
 dwt : Weighing display mode (pennyweight)  
GN : Weighing display mode (grain unit)  
PC : Counting mode (pcs)  
% : Percentage mode (%)

- C<sub>R</sub>L<sub>F</sub> will be output as the terminator, regardless of the function setting.

Examples of output data formats:

Weight data	S T , + 0 0 1 2 3 4 . 5 <input type="text"/> <input type="text"/> g C <sub>R</sub> L <sub>F</sub>
Counting data	Q T , + 0 0 0 0 1 2 3 4 <input type="text"/> P C C <sub>R</sub> L <sub>F</sub>
Percentage data	S T , + 0 0 0 1 2 3 . 4 <input type="text"/> <input type="text"/> % C <sub>R</sub> L <sub>F</sub>
During weight overload	O L , + 9 9 9 9 9 9 . 9 <input type="text"/> <input type="text"/> g C <sub>R</sub> L <sub>F</sub>
Minus and counting overload	O L , - 9 9 9 9 9 9 9 9 <input type="text"/> P C C <sub>R</sub> L <sub>F</sub>

Interface circuit



- 1 Frame Ground
- 2 Receive Data
- 3 Transmit Data
- 4 Request to Send
- 5 Clear to Send
- 6 Data Set Ready
- 7 Signal Ground
- 8 } Not connected
- 25 }

Compatible connector  
AX-HDB-25P/CTR (Sold separately)

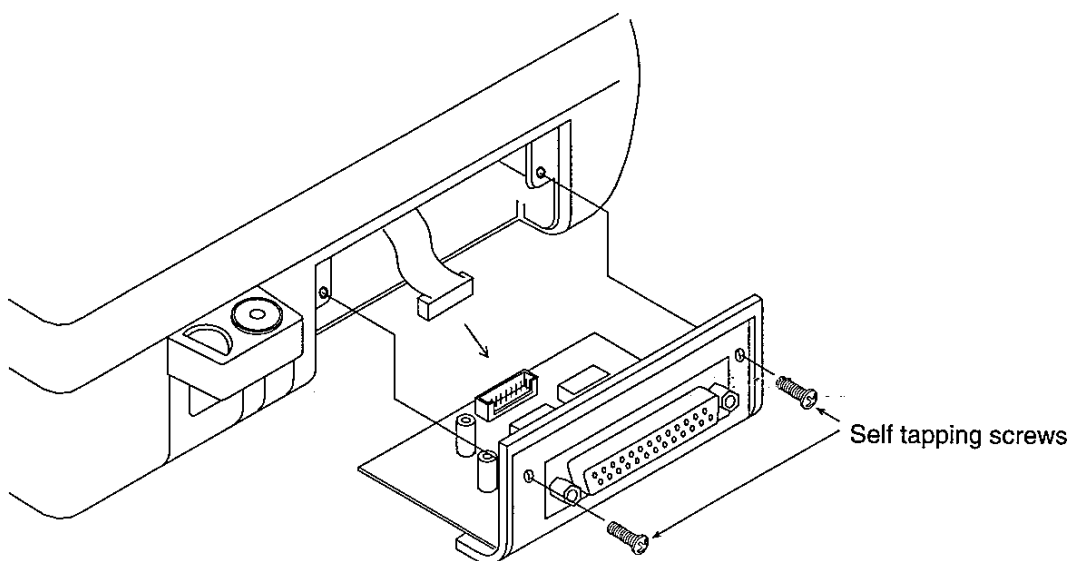
## When the AD-8121 is connected

The following settings will be necessary according to the printing method.

Printing method	EK/EW F2 setting	AD-8121 dip switch settings			
		No.1	No.2	No.3	No.4
EK/EW [PRINT] key	1	OFF	OFF	OFF	OFF
Auto print	2 or 3	OFF	OFF	OFF	OFF
AD-8121 [DATA] key	0	ON	OFF	OFF	OFF

## OP-03 installation

1. Remove the cover of the option attaching part on the rear of the main unit by pressing and lowering this cover.



2. Insert the connector of the main unit into the option board connector.
3. Insert the option board into the main unit and mount it using the attached self tapping screws.

Take care not to over-tighten the screws.



## 7-2 OP-04 Comparator relay output

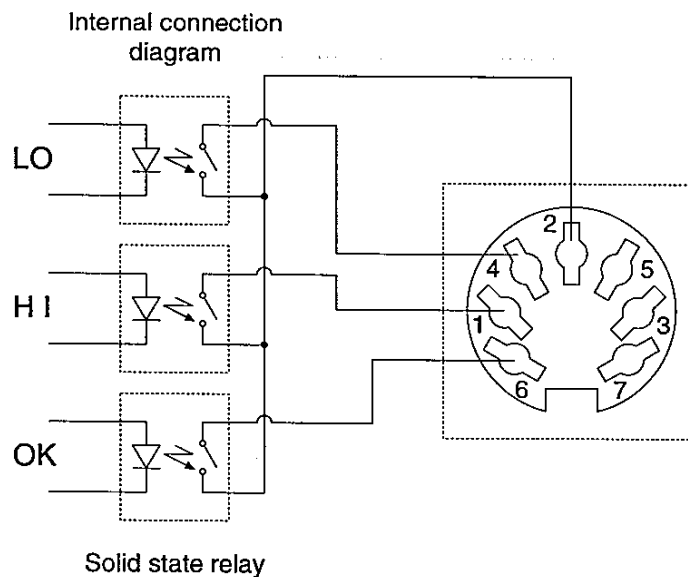
Allows output of the HI, OK or LO signal comparison results to an external device as a solid state relay output.

It is possible to sound a buzzer according to each type of comparison result.

■ **The comparator function on/off, the comparison mode and comparator buzzer output can be selected using the function settings.**

**See Chapter 6: Function modes.**

### Output circuit



The absolute maximum rating of the output is as follows. Do not exceed these ratings.

Maximum voltage: 50V Maximum current: 100mA Maximum ON resistance: 8Ω

### OP-04 installation

Refer to the OP-03 installation.

### 7-3 OP-05 Printer interface (Current loop output)

The current loop output is of the passive type and is not polarity sensitive. It may be used with remote indicators, printers.

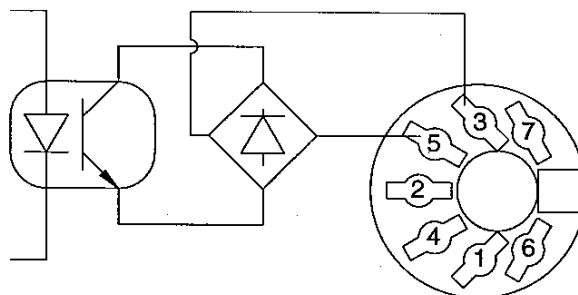
It requires an external source of 20mA DC.

This interface may be used for connection to the AD-8121 printer. The optional cable AD-8121-08 is required for the AD-8121.

Carry out the settings as follows according to the printing method:

Printing method	EK/EW F2 setting	AD-8121 dip switch settings			
		No.1	No.2	No.3	No.4
EK/EW [PRINT] key	1	OFF	OFF	OFF	ON
Auto print	2 or 3	OFF	OFF	OFF	ON
AD-8121 [DATA] key	0	ON	OFF	OFF	ON

#### Output circuit



Internal connection diagram. Pins 1, 2, 4, 6 and 7 are not connected

#### OP-05 installation

Refer to the OP-03 installation.

---

## 7-4 OP-07 Under hook assembly

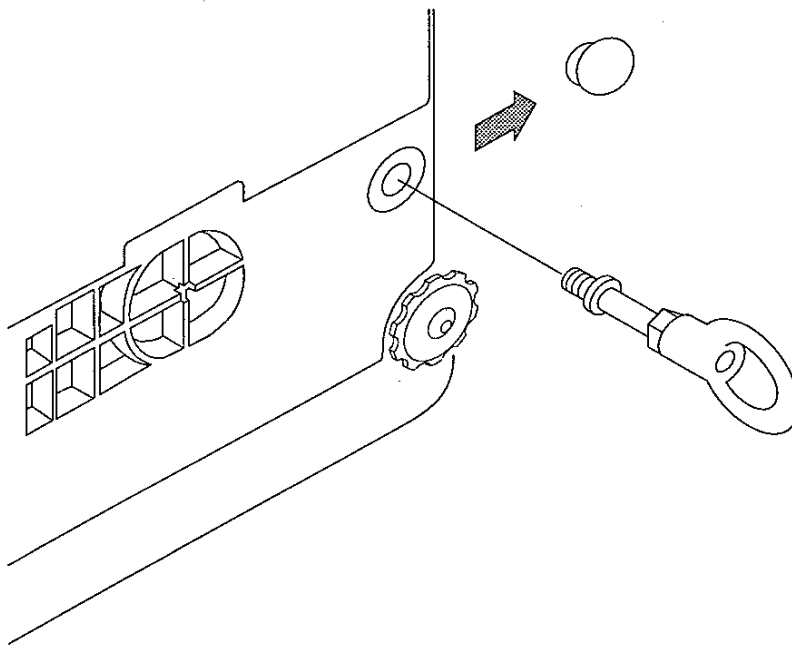
By attaching the under hook assembly to the bottom of the main unit, large objects that are difficult to load on the weighing pan can be weighed in suspension, and the specific gravity may be measured, etc.

**OP-07 is limited to use with the EK-6000G/12KG balances.**

### OP-07 installation

Remove the cover on the bottom of the main unit.

Screw the under hook assembly into the mounting hole.

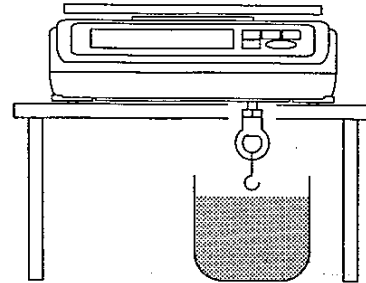


### e.g. Specific gravity measurement

This measurement method can be used if the sample does not absorb water.

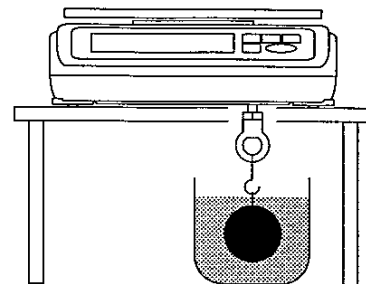
1. Prepare a platform for the balance and a container that has an adequate capacity to allow the sample to be input, and fill the container with water. Attach a fine wire or fishing line that will not absorb water to suspend the sample.

As shown in the illustration at right, place the balance on the platform and arrange the container below the platform.

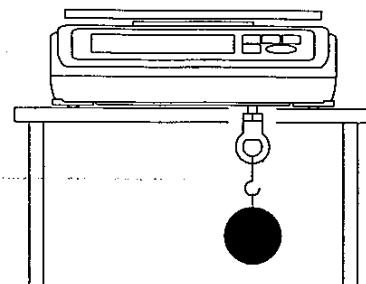


2. Set the display to show the 100% weight registration in the percentage mode.

3. Lower the sample and submerge it in the water. When the Stable mark is displayed, press the [ZERO] key. Take care at this time that the sample is not resting on the bottom of the container or touching the sides.



4. Take the sample out of the water and suspend it in the air after removing the moisture. When the Stable mark is displayed, press the [ENTER] key. At this time, the difference between the weight in air and the weight in water will be registered as the 100% weight.



5. Press the [ZERO] key to set the display to "0.0%".
6. Lower the suspended sample. The specific gravity will be displayed as a 100 times larger minus value. For example, a display of "-278.9%" represents a specific gravity value of 2.789.

---

## 7-5 OP-09 Rechargeable battery pack (NiCd)

By incorporating the rechargeable battery pack (NiCd) in the balance, cordless continuous operation can be carried out for 9 hours. (When the OP-03/04/05 options are attached, the usable time will be approximately 7 hours. The time may vary according to the method of use.)

- **Before using the battery pack for the first time, charge it using the AC adaptor included with the main unit.**
- **If "Lb" is displayed when using the battery pack, immediately stop using the battery and recharge it or change to using the AC adaptor.**

### Charging the battery pack

1. With the AC adaptor attached in the power OFF condition, set the FULL/TRI switch on the bottom of the main unit to FULL.

When the battery is fully discharged ("Lb" display), it will take 15 hours to fully charge it.

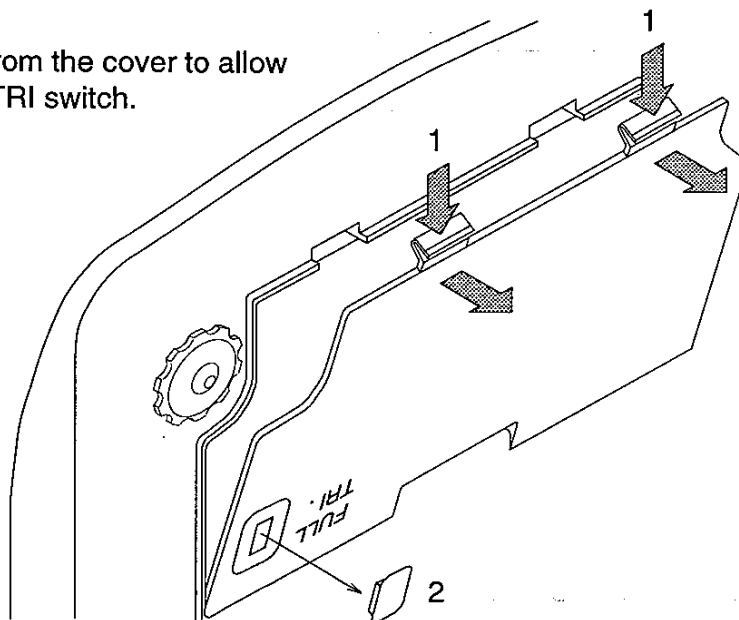
2. After completion of the charging, set the FULL/TRI switch to the TRI side to prevent over-charging.

### OP-09 installation

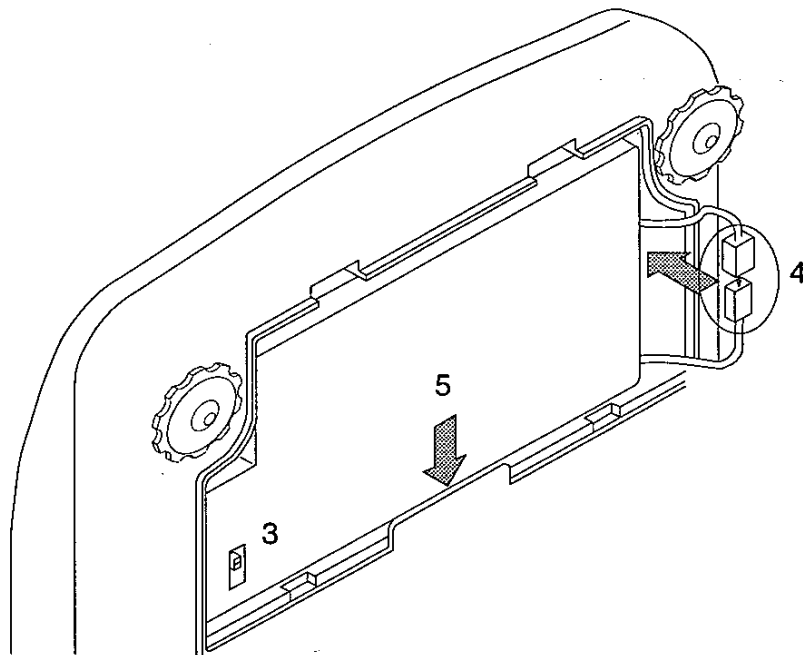
1. Detach the cover of the battery holder on the bottom of the main unit by pulling the cover forward while pressing the two catches(1).

Be sure not to apply an inappropriate force to the weighing pan.

2. Remove the cap(2) from the cover to allow access to the FULL/TRI switch.



- 
3. Arrange the battery pack with the surface that has the FULL/TRI switch is facing forwards(3).
  4. Attach the connector from the main unit to the battery pack connector(4).  
Arrange the connectors inside the main unit.
  5. Insert the battery pack inside the main unit towards the bottom, and attach the cover as before. This completes the battery mounting operation.



## 7-6 OP-11 Carrying case

These exclusive carrying cases are available to allow convenient transportation of the equipment. However, note that because these balances are precision machines, they will not be able to withstand excessive shock such as being dropped, etc.

## Chapter 8: Maintenance

### Before requesting repairs....

Because these instruments are precision balances, take adequate care during handling not to subject the instruments to strong shocks. Further, when sending the instruments for repair, check the following items:

In this situation....	Confirm these items
The instrument does not switch ON	<ul style="list-style-type: none"><li>1 Is the battery correctly inserted?</li><li>1 Is the battery charged?</li><li>1 Is the AC adaptor properly connected?</li></ul>
All the displays remain as they are	<ul style="list-style-type: none"><li>1 Is there any wind or vibration?</li></ul>
The "-----" display is shown constantly	<ul style="list-style-type: none"><li>1 Were the balance switched ON while there was a load on the weighing pan?</li><li>1 Try pressing the [MODE] key.</li><li>1 Is the zero point value greatly displaced? Carry out the zero point calibration.</li></ul>
The weighed value is not correct	<ul style="list-style-type: none"><li>1 Is the zero point correctly set?</li><li>1 Are the balance correctly leveled?</li><li>1 Is the value for the acceleration due to gravity appropriate?</li><li>1 Is the weighing pan correctly mounted?</li><li>1 Is the span displaced? Carry out the span calibration.</li></ul>

## Chapter 9: Specifications

MODEL	EK-120G	EK-200G	EK-600G
Max. weight      gram	120	200	600
Min. display (d)   gram	0.01	0.01	0.1
Number of samples	10, 25, 50 or 100 pieces		
Max. counting number	12000 pieces	20000 pieces	6000 pieces
Min. unit weight	0.01 g	0.1 g	0.1 g
Max. percentage display	12000.0%	20000.0%	6000.0%
Min. percentage display	0.1%		
Min. 100% weight	1 g	1 g	10 g
Display	7 segment liquid crystal display. Character height 16 mm		
Display refresh	4 times per second		
Repeatability	±0.01 g	±0.01 g	±0.1 g
Linearity	±0.01 g	±0.01 g	±0.1 g
Sensitivity drift	±20ppm/°C(10°C ~ 30°C/50°F ~ 86°F) typically		
Operating temperature	-10°C ~ 40°C/14°F ~ 104°F R.H. less than 85% (Non-condensing)		
Power source	100, 120, 220, 240 VAC (AC adaptor) 50Hz/60Hz 9 hours continuous operation with battery pack (Optional)		
Weighing pan size	110 mmø		133 mm x 170 mm
External dimensions	190 mm (W) x 218 mm (D) x 66 mm (H)		
Weight(Approximately)	810 g		1000 g
Calibration weight	100 g	200 g	600 g

MODEL	EK-1200G	EK-2000G	EK-6000G	EK-12KG
Max. weight gram	1200	2000	6000	12000
Min. display (d) gram	0.1	0.1	1	1
Number of samples	10, 25, 50 or 100 pieces			
Max. counting number	12000 pieces	20000 pieces	6000 pieces	12000 pieces
Min. unit weight	0.1 g	0.1 g	1 g	1 g
Max. percentage display	12000.0%	20000.0%	6000.0%	12000.0%
Min. percentage display	0.1%			
Min. 100% weight	10 g	10 g	100 g	100 g
Display	7 segment liquid crystal display. Character height 16 mm			
Display refresh	4 times per second			
Repeatability	±0.1 g	±0.1 g	±1 g	±1 g
Linearity	±0.1 g	±0.1 g	±1 g	±1 g
Sensitivity drift	±20ppm/°C(10°C ~ 30°C/50°F ~ 86°F) typically			
Operating temperature	-10°C ~ 40°C/14°F ~ 104°F R.H. less than 85% (Non-condensing)			
Power source	100, 120, 220, 240 VAC (AC adaptor) 50Hz/60Hz 9 hours continuous operation with battery pack (Optional)			
Weighing pan size	133 mm x 170 mm			
External dimensions	190 mm (W) x 218 mm (D) x 66 mm (H)			
Weight(Approximately)	1 kg		1.24 kg	1.3 kg
Calibration weight	1 kg	2 kg	6 kg	10 kg



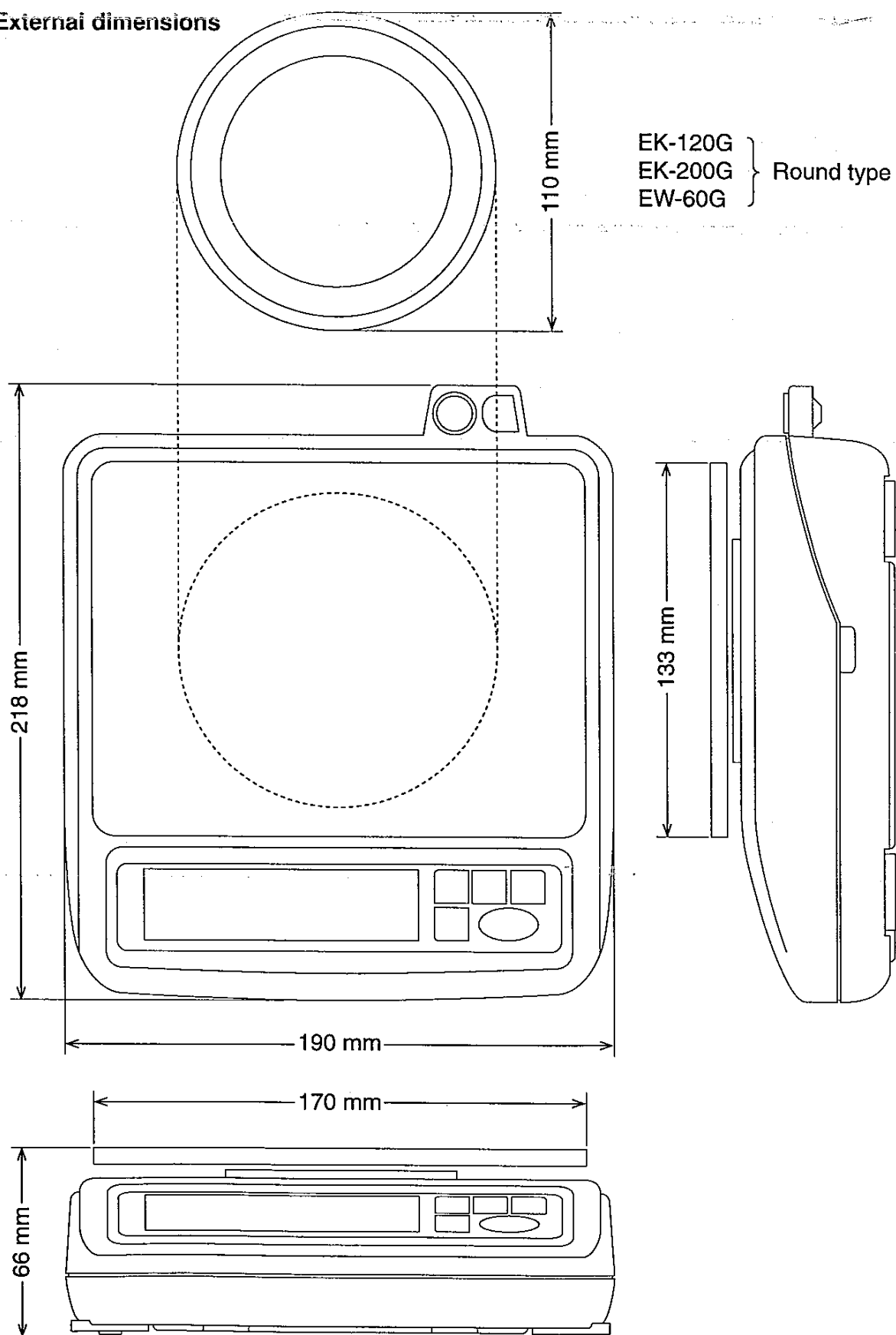
MODEL	EW-60G	EW-300G	EW-600G	EW-3000G
Max. weight gram	60	300	600	3000
Min. display (d) gram	0.02	0.1	0.2	1
Number of samples	10, 25, 50 or 100 picecs			
Max. counting number	3000 picecs			
Min. unit weight	0.02 g	0.1 g	0.2 g	1 g
Max. percentage display	3000.0%			
Min. percentage display	0.1%			
Min. 100% weight	2 g	10 g	20 g	100 g
Display	7 segment liquid crystal display. Character height 16 mm			
Display refresh	4 times per second			
Repeatability	±0.02 g	±0.1 g	±0.2 g	±1 g
Linearity	±0.02 g	±0.1 g	±0.2 g	±1 g
Sensitivity drift	±20ppm/°C(10°C ~ 30°C/50°F ~ 86°F) typically			
Operating temperature	-10°C ~ 40°C/14°F ~ 104°F R.H. less than 85% (Non-condensing)			
Power source	100, 120, 220, 240 VAC (AC adaptor) 50Hz/60Hz 9 hours continuous operation with battery pack (Optional)			
Weighing pan size	110 mmø	133 mm x 170 mm		
External dimensions	190 mm (W) x 218 mm (D) x 66 mm (H)			
Weight(Approximately)	810 g	1000 g		1.24 kg
Calibration weight	60 g	300 g	600 g	3 kg

MODEL	EK-120G	EK-200G	EK-600G	EK-1200G	EK-2000G
Max. weight decimal ounce	4.2330	7.0550	21.165	42.330	70.550
Min. display decimal ounce	0.0005	0.0005	0.005	0.005	0.005
Max. weight decimal pound	0.26455	0.44090	1.3230	2.6455	4.4090
Min. display decimal pound	0.00005	0.00005	0.0005	0.0005	0.0005
Max. weight troy ounce	3.8580	6.4300	19.290	38.580	64.300
Min. display troy ounce	0.0005	0.0005	0.005	0.005	0.005
Max. weight carat	600	1000	3000	6000	10000
Min. display carat	0.05	0.05	0.5	0.5	0.5
Max. weight momme	32	53.335	160	320	533.35
Min. display momme	0.005	0.005	0.05	0.05	0.05
Max. weight pennyweight	77.16	128.60	385.8	771.6	1286.0
Min. display pennyweight	0.01	0.01	0.1	0.1	0.1
Max. weight grain unit	1851.8	3086.4	9260	18518	30864
Min. display grain unit	0.2	0.2	2	2	2
Max. weight tael*	3.1745	5.2910	15.875	31.745	52.910
Min. display tael*	0.0005	0.0005	0.005	0.005	0.005

MODEL	EK-6000G	EK-12KG	EW-60G	EW-300G	EW-600G	EW-3000G
Max. weight decimal ounce	211.65	423.30	2.116	10.580	21.16	105.80
Min. display decimal ounce	0.05	0.05	0.001	0.005	0.01	0.05
Max. weight decimal pound	13.230	26.455	0.13230	0.6615	1.3230	6.615
Min. display decimal pound	0.005	0.005	0.00005	0.0005	0.0005	0.005
Max. weight troy ounce	192.90	385.80	1.929	9.645	19.29	96.45
Min. display troy ounce	0.05	0.05	0.001	0.005	0.01	0.05
Max. weight carat	30000	60000	300	1500	3000	15000
Min. display carat	5	5	0.1	0.5	1	5
Max. weight momme	1600	3200	16	80	160	800
Min. display momme	0.5	0.5	0.01	0.05	0.1	0.5
Max. weight pennyweight	3858	7716	38.58	192.9	385.8	1929
Min. display pennyweight	1	1	0.02	0.1	0.2	1
Max. weight grain unit	92600	185180	926.0	4630	9260	46300
Min. display grain unit	20	20	0.5	2	5	20
Max. weight tael*	158.75	317.45	1.587	7.935	15.87	79.35
Min. display tael*	0.05	0.05	0.001	0.005	0.01	0.05

\*Tael (Hong Kong General) is the special version.

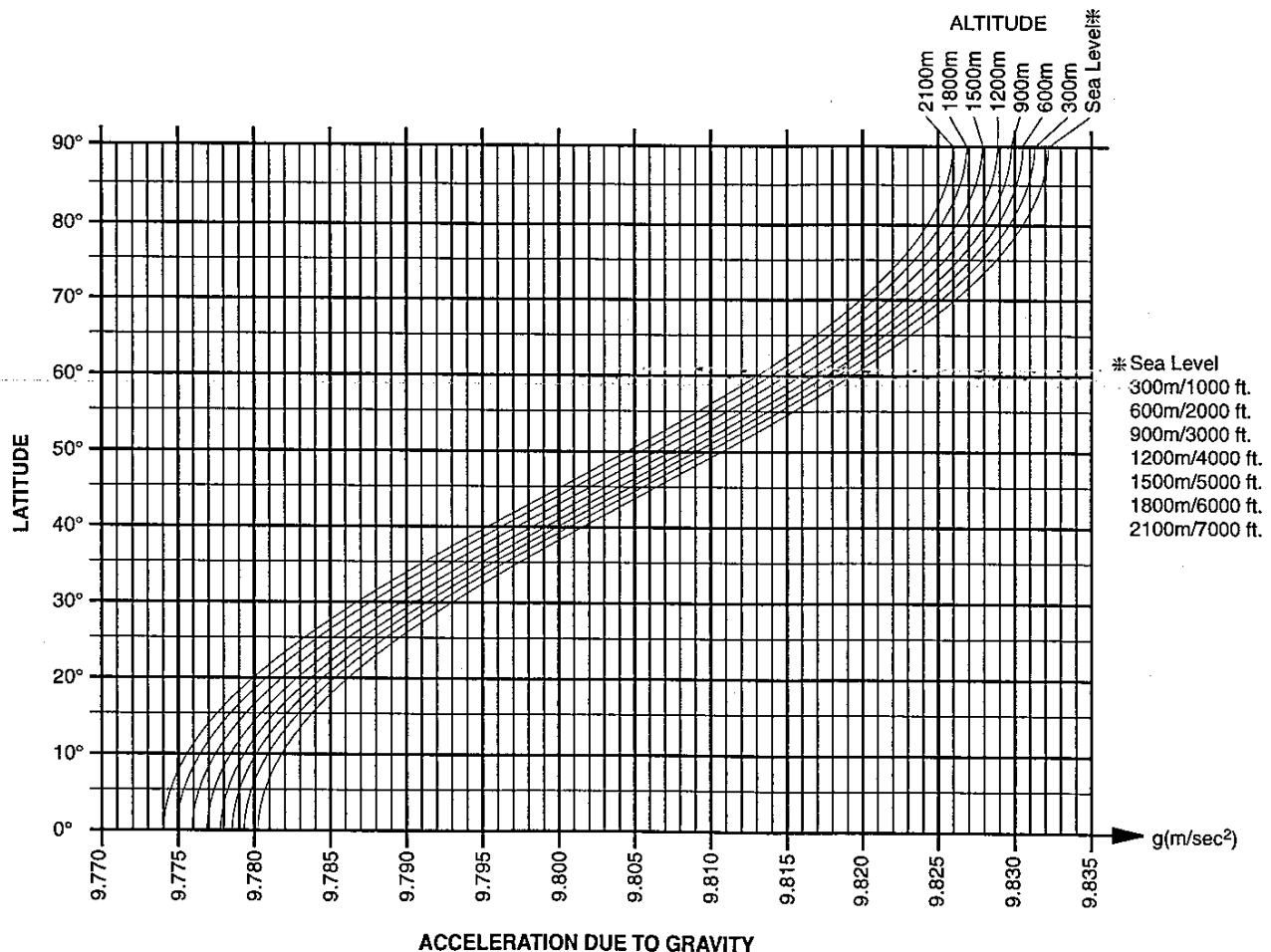
## External dimensions



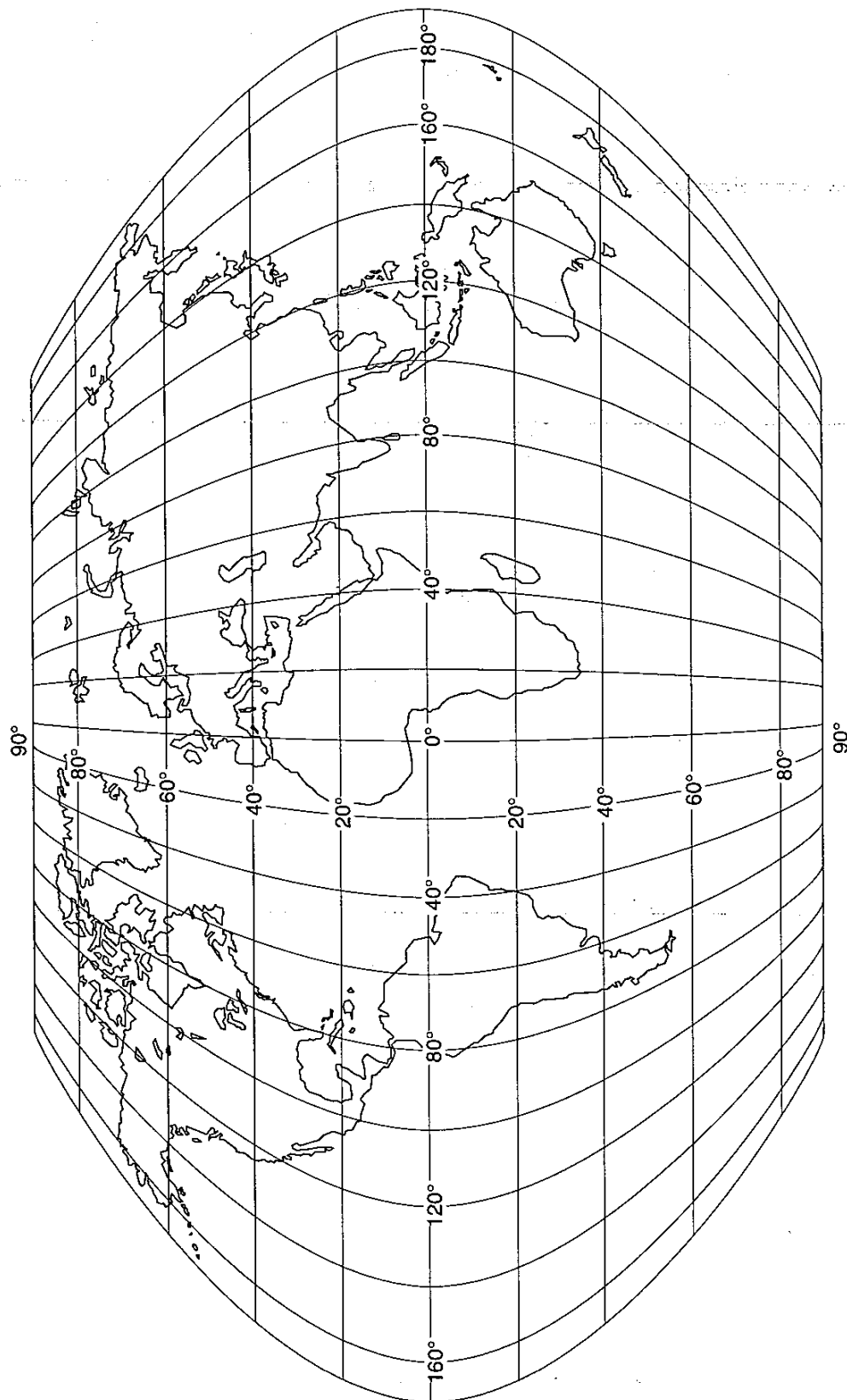
# Gravity acceleration map

## Value of Gravity at Various Locations

Amsterdam	9.813 m/sec <sup>2</sup>	Manila	9.784 m/sec <sup>2</sup>
Athens	9.800 m/sec <sup>2</sup>	Melbourne	9.800 m/sec <sup>2</sup>
Auckland NZ	9.799 m/sec <sup>2</sup>	Mexico City	9.779 m/sec <sup>2</sup>
Bangkok	9.783 m/sec <sup>2</sup>	Milan	9.806 m/sec <sup>2</sup>
Birmingham	9.813 m/sec <sup>2</sup>	New York	9.802 m/sec <sup>2</sup>
Brussels	9.811 m/sec <sup>2</sup>	Oslo	9.819 m/sec <sup>2</sup>
Buenos Aires	9.797 m/sec <sup>2</sup>	Ottawa	9.806 m/sec <sup>2</sup>
Calcutta	9.788 m/sec <sup>2</sup>	Paris	9.809 m/sec <sup>2</sup>
CapeTown	9.796 m/sec <sup>2</sup>	Rio de Janeiro	9.788 m/sec <sup>2</sup>
Chicago	9.803 m/sec <sup>2</sup>	Rome	9.803 m/sec <sup>2</sup>
Copenhagen	9.815 m/sec <sup>2</sup>	San Francisco	9.800 m/sec <sup>2</sup>
Cyprus	9.797 m/sec <sup>2</sup>	Singapore	9.781 m/sec <sup>2</sup>
Djakarta	9.781 m/sec <sup>2</sup>	Stockholm	9.818 m/sec <sup>2</sup>
Frankfurt	9.810 m/sec <sup>2</sup>	Sydney	9.797 m/sec <sup>2</sup>
Glasgow	9.816 m/sec <sup>2</sup>	Taichung	9.789 m/sec <sup>2</sup>
Havana	9.788 m/sec <sup>2</sup>	Taiwan	9.788 m/sec <sup>2</sup>
Helsinki	9.819 m/sec <sup>2</sup>	Taipei	9.790 m/sec <sup>2</sup>
Kuwait	9.793 m/sec <sup>2</sup>	Tokyo	9.798 m/sec <sup>2</sup>
Lisbon	9.801 m/sec <sup>2</sup>	Vancouver, BC	9.809 m/sec <sup>2</sup>
London (Greenwich)	9.812 m/sec <sup>2</sup>	Washington DC	9.801 m/sec <sup>2</sup>
Los Angeles	9.796 m/sec <sup>2</sup>	Wellington NZ	9.803 m/sec <sup>2</sup>
Madrid	9.800 m/sec <sup>2</sup>	Zurich	9.807 m/sec <sup>2</sup>



## World Map



# MEMORANDA

[illegible]This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, leaving small margins at the top and bottom. There is no handwriting or printed text on the page.